Wisconsin River Basin Water Quality Improvement Project

5th Annual Wisconsin River Symposium

March 19, 2015

Ann Hirekatur, TMDL Project Manager

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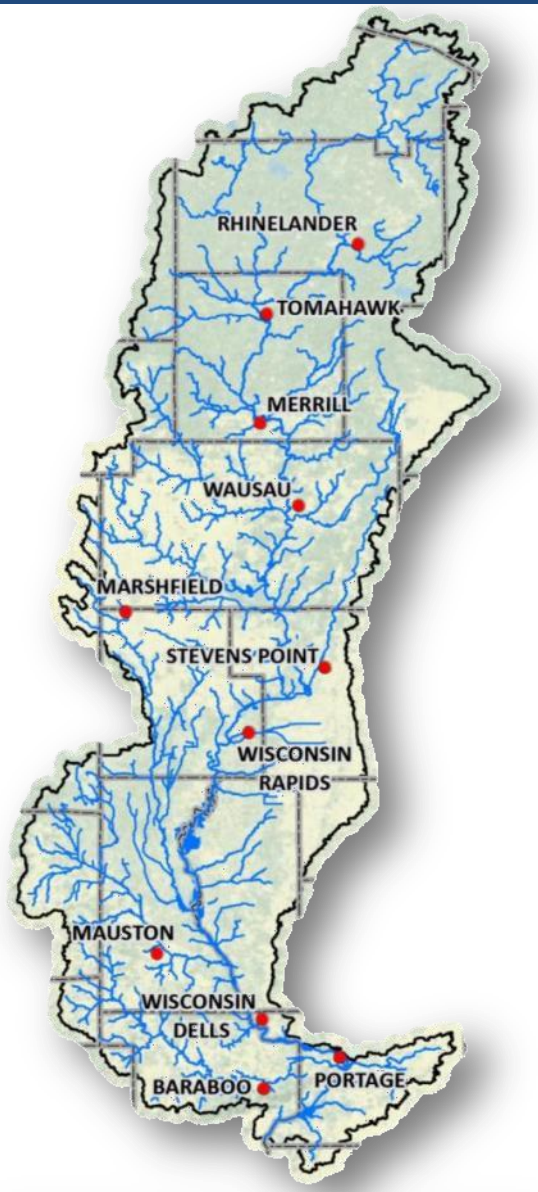
Photo by James Brodzeller

Wisconsin River Basin Water Quality Improvement Project

Part I

PROJECT OVERVIEW
PAST, PRESENT & FUTURE

The Wisconsin River Basin (WRB) Water Quality Improvement Project



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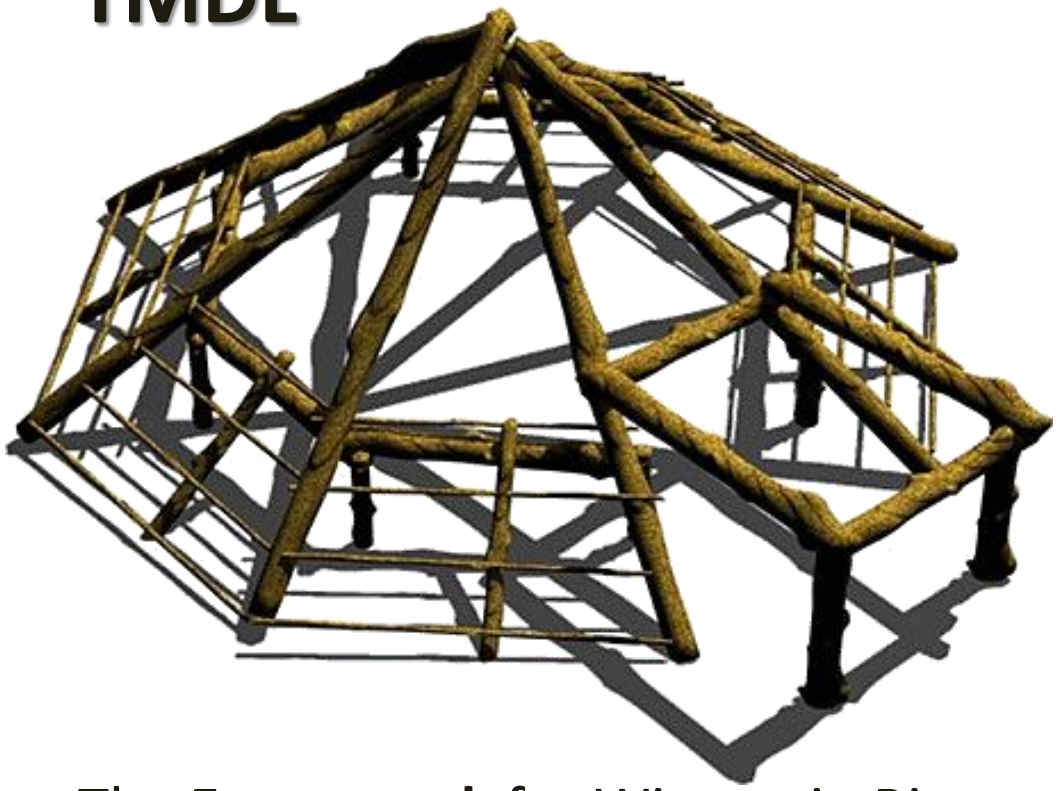
Project Framework = Total Maximum Daily Load

TMDL



The **Framework** for Wisconsin River Basin Water Quality Improvement Project

A TMDL answers the following questions:

- How much is the existing pollutant load? What is the contribution from each source?
- How much does pollution need to be reduced in order for waterways to achieve water quality standards?
- How will the pollutant load reductions be achieved?

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Why develop a TMDL?

Baseline Pollutant Load

Does not meet water quality standards

Total Maximum Daily Load

Meets water quality standards

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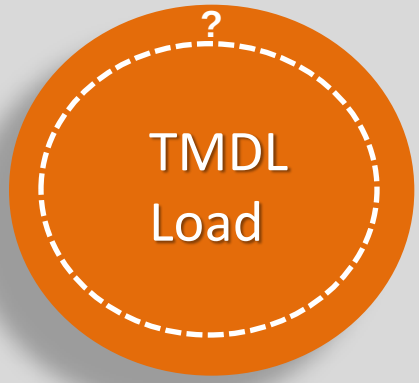
Developing a TMDL



What is the magnitude of the
Total **M**aximum **D**aily **L**oad ?

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Developing a TMDL

Baseline Pollutant Load

How will the load be apportioned among sources?

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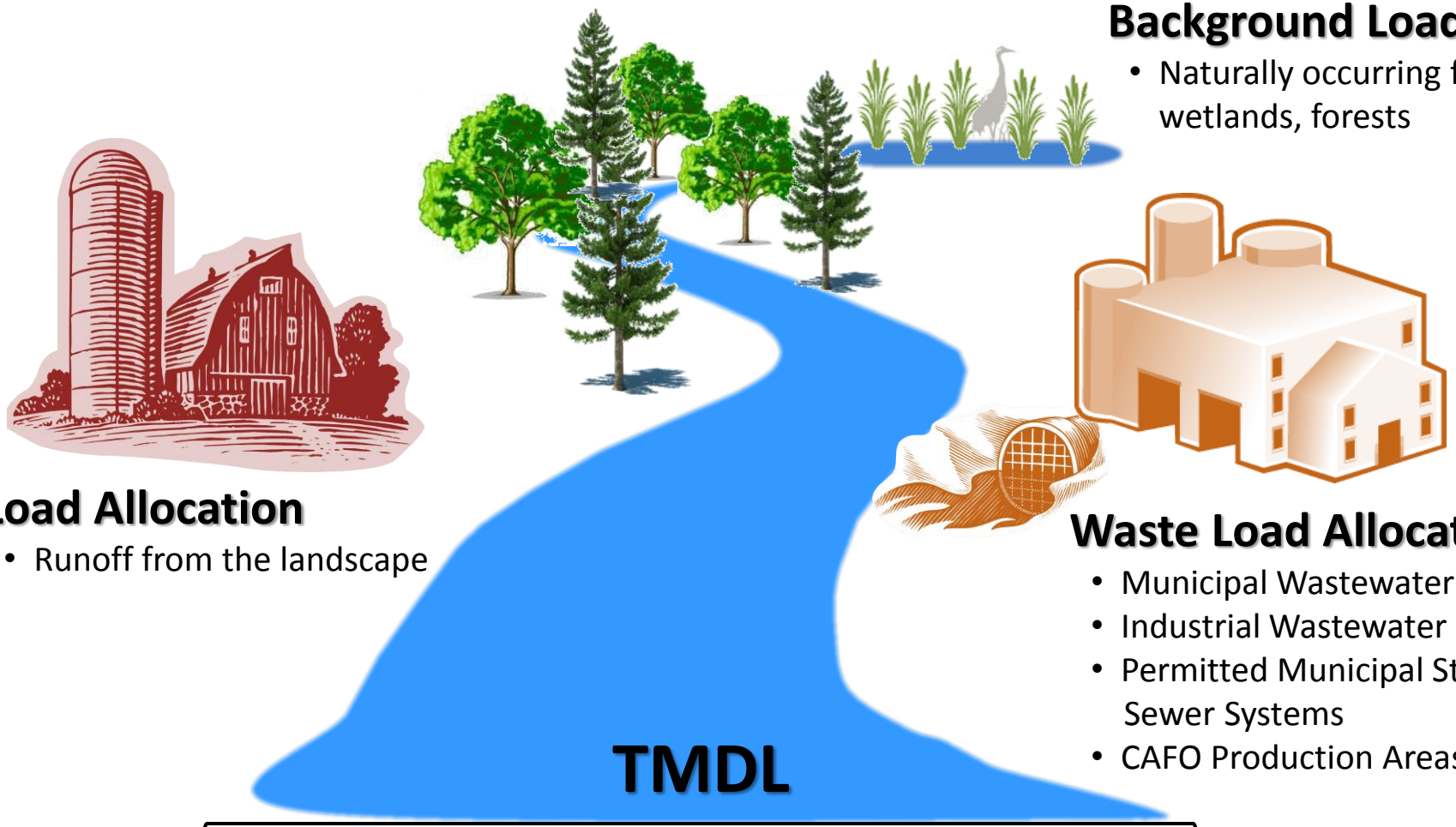
WRB Total Maximum Daily Load (TMDL)

Each subwatershed is assessed for:



Background Load

- Naturally occurring from wetlands, forests

Load Allocation

- Runoff from the landscape

Waste Load Allocation

- Municipal Wastewater
- Industrial Wastewater
- Permitted Municipal Storm Sewer Systems
- CAFO Production Areas

TMDL

Load Allocation + Waste Load Allocation + Margin of Safety

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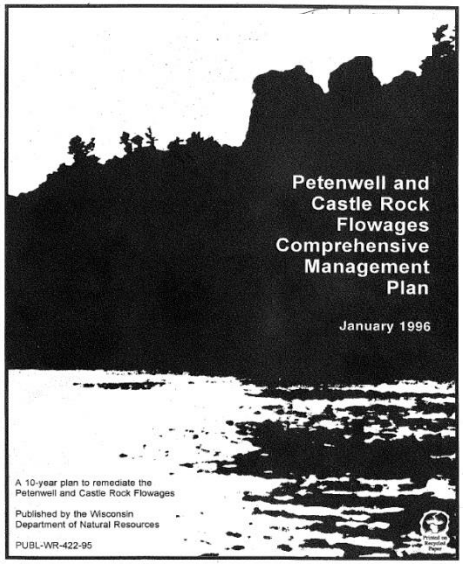
WRB Water Quality Improvement Project

Past, Present and Future…..

1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025…

1991-1996
Petenwell
Castle Rock
Comprehensive
Management
Planning



WISCONSIN
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WRB Water Quality Improvement Project

Past, Present and Future…..

2001&2004
Unsuccessful Funding Proposals

1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025…

1991-1996
Petenwell Castle Rock Comprehensive Management Planning

WISCONSIN DEPT. OF NATURAL RESOURCES

WRB Water Quality Improvement Project

Past, Present and Future…..

2001-2004
Unsuccessful Funding Proposals

2008
First Pontoons and Politics

1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025…

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WISCONSIN DEPT. OF NATURAL RESOURCES

WRB Water Quality Improvement Project

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Petenwell Castle Rock Comprehensive Management Planning

2009-2014

- State Legislature appropriates $750,000 over 5 years →
- Comprehensive Basin Monitoring

WISCONSIN DEPT. OF NATURAL RESOURCES

WRB Water Quality Improvement Project

Past, Present and Future…..

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1991-1996
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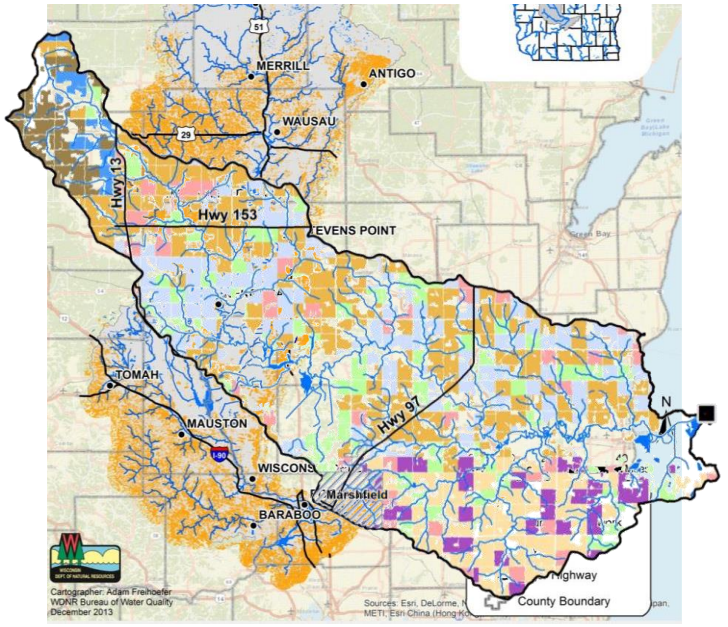
2009-2014

- State Legislature appropriates $750,000 over 5 years →
- Comprehensive Basin Monitoring

- Basin-wide Land Use & Land Management Mapping



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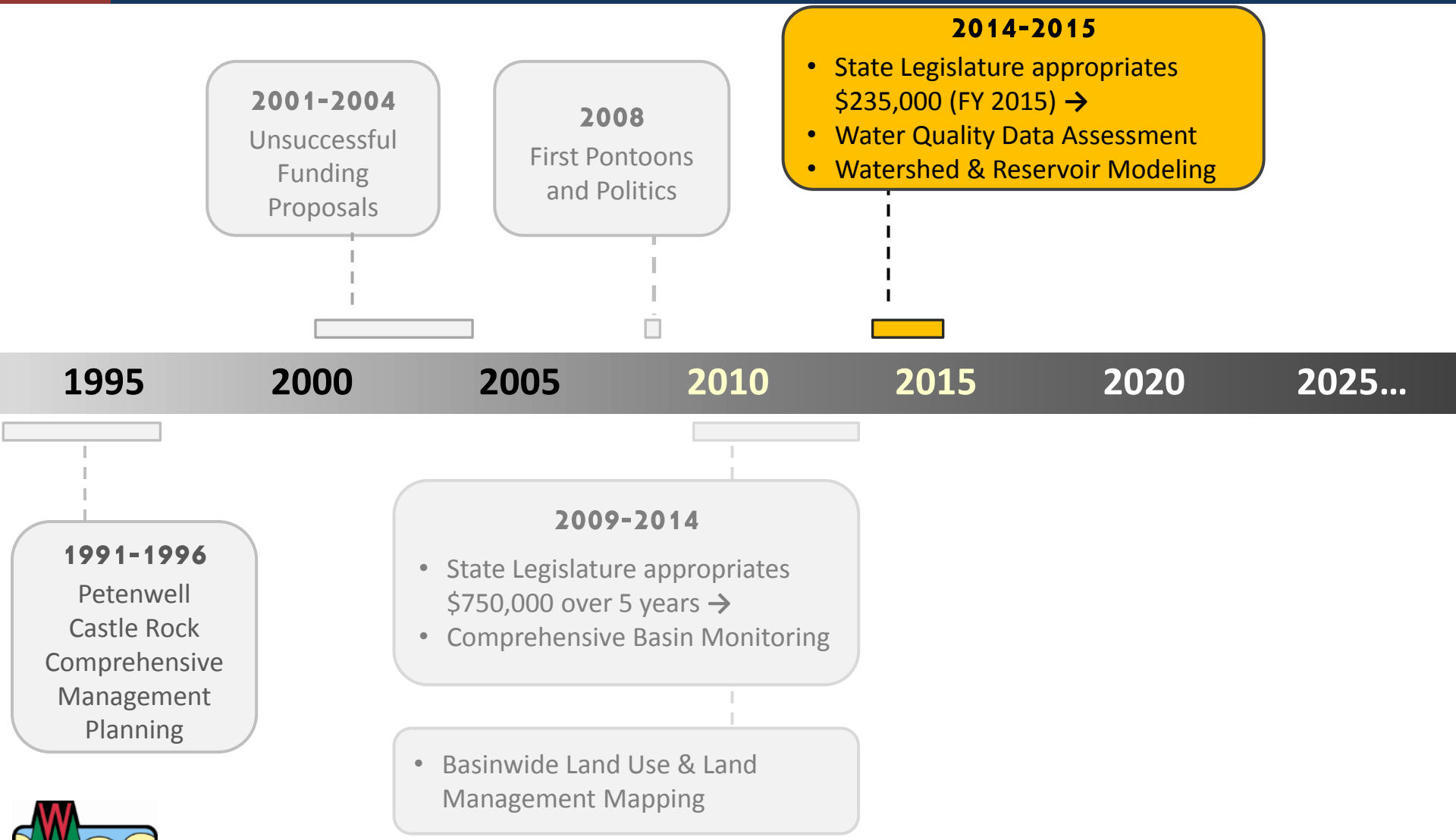
WRB Water Quality Improvement Project

Past, Present and Future…..



WISCONSIN DEPT. OF NATURAL RESOURCES

WRB Water Quality Improvement Project

Past, Present and Future…..

2001-2004
Unsuccessful Funding Proposals

2008
First Pontoons and Politics

2014-2015
- State Legislature appropriates $235,000 (FY 2015)
- Water Quality Data Assessment
- Watershed & Reservoir Modeling

1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025…

1991-1996
Petenwell Castle Rock Comprehensive Management Planning

2009-2014
- State Legislature appropriates $750,000 over 5 years →
- Comprehensive Basin Monitoring

- Basinwide Land Use & Land Management Mapping

Baseline

TMDL

2015-2016
Allocation Development

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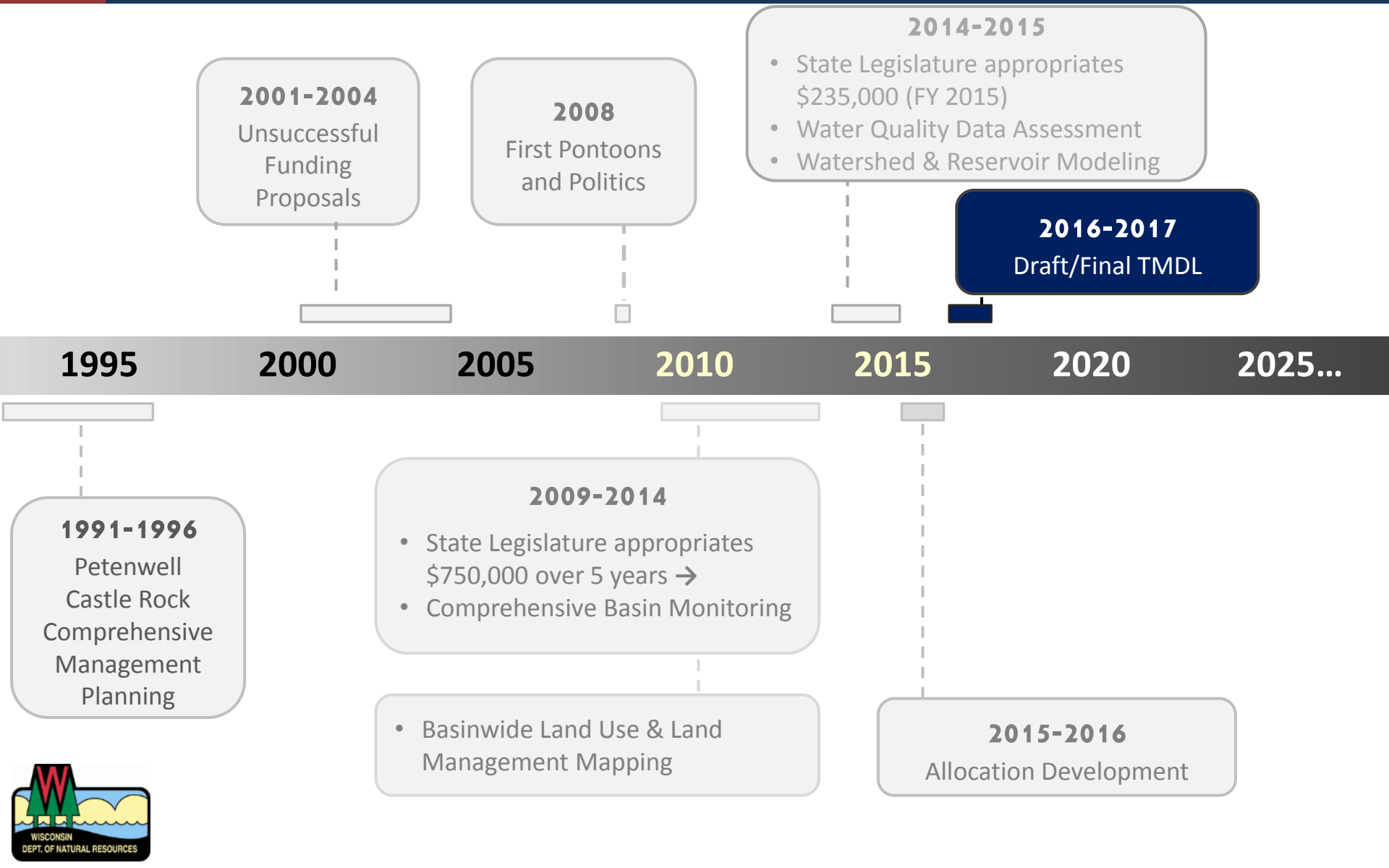
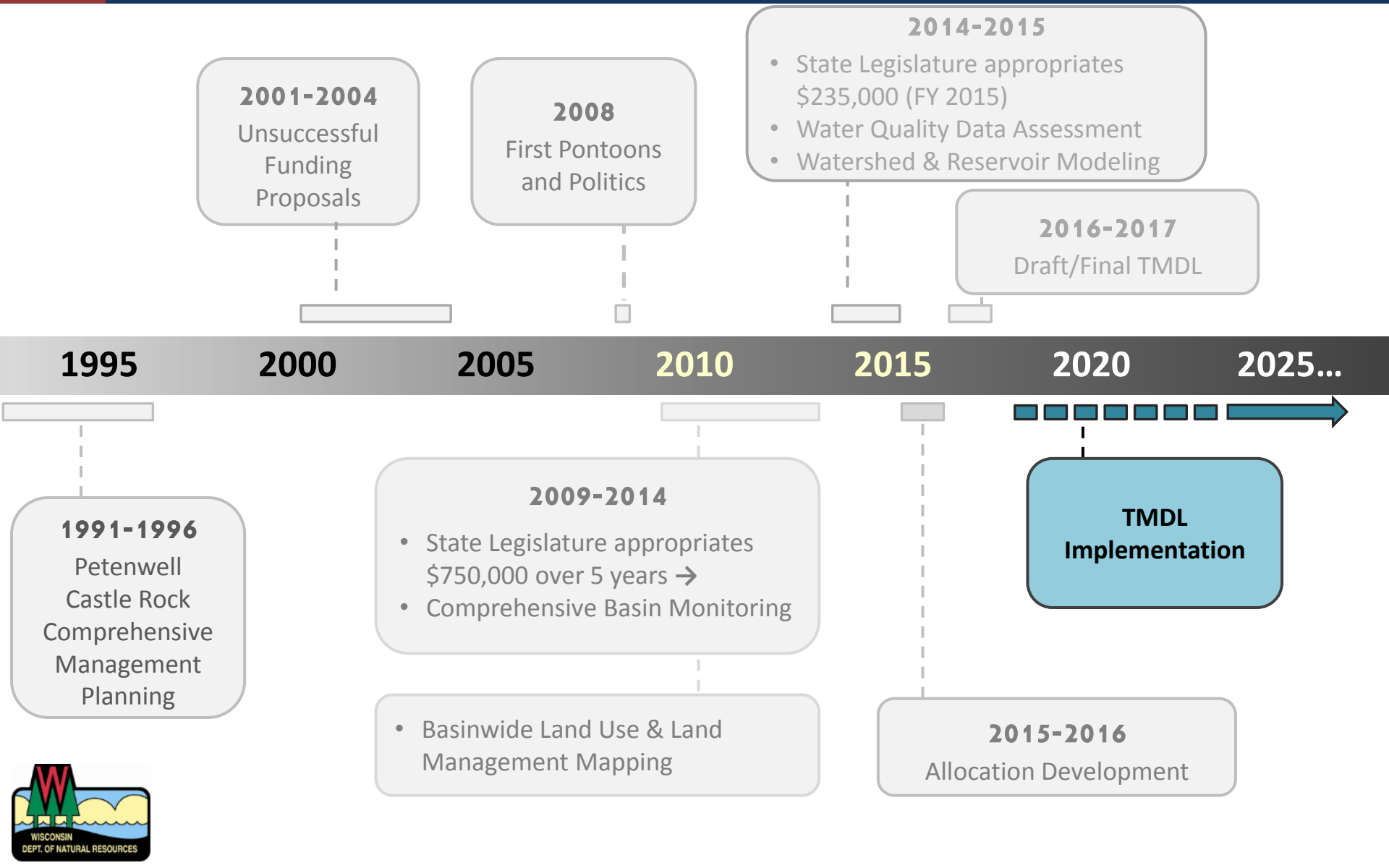
WRB Water Quality Improvement Project

Past, Present and Future…..



WRB Water Quality Improvement Project

Past, Present and Future…..



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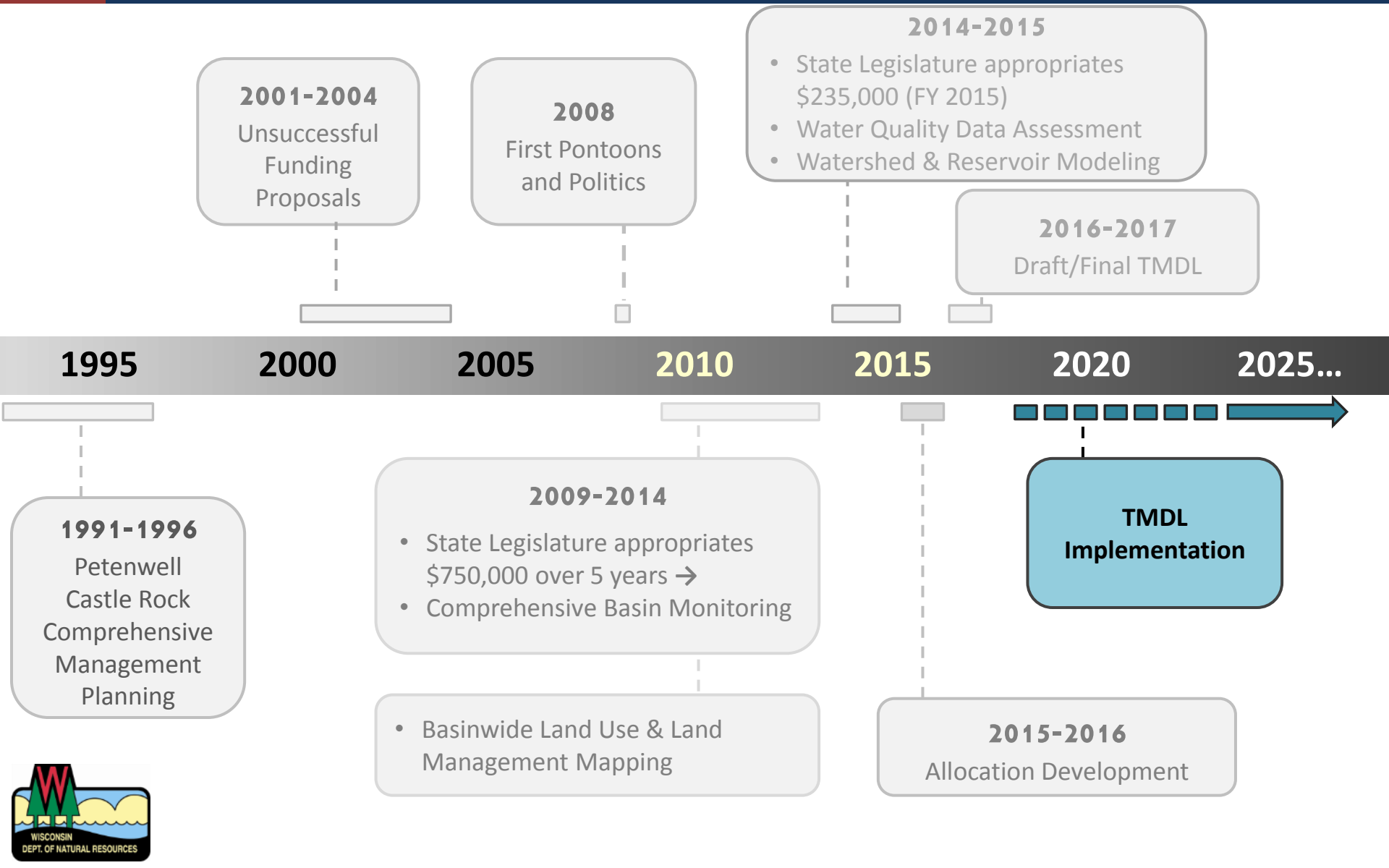
Past, Present and Future…..



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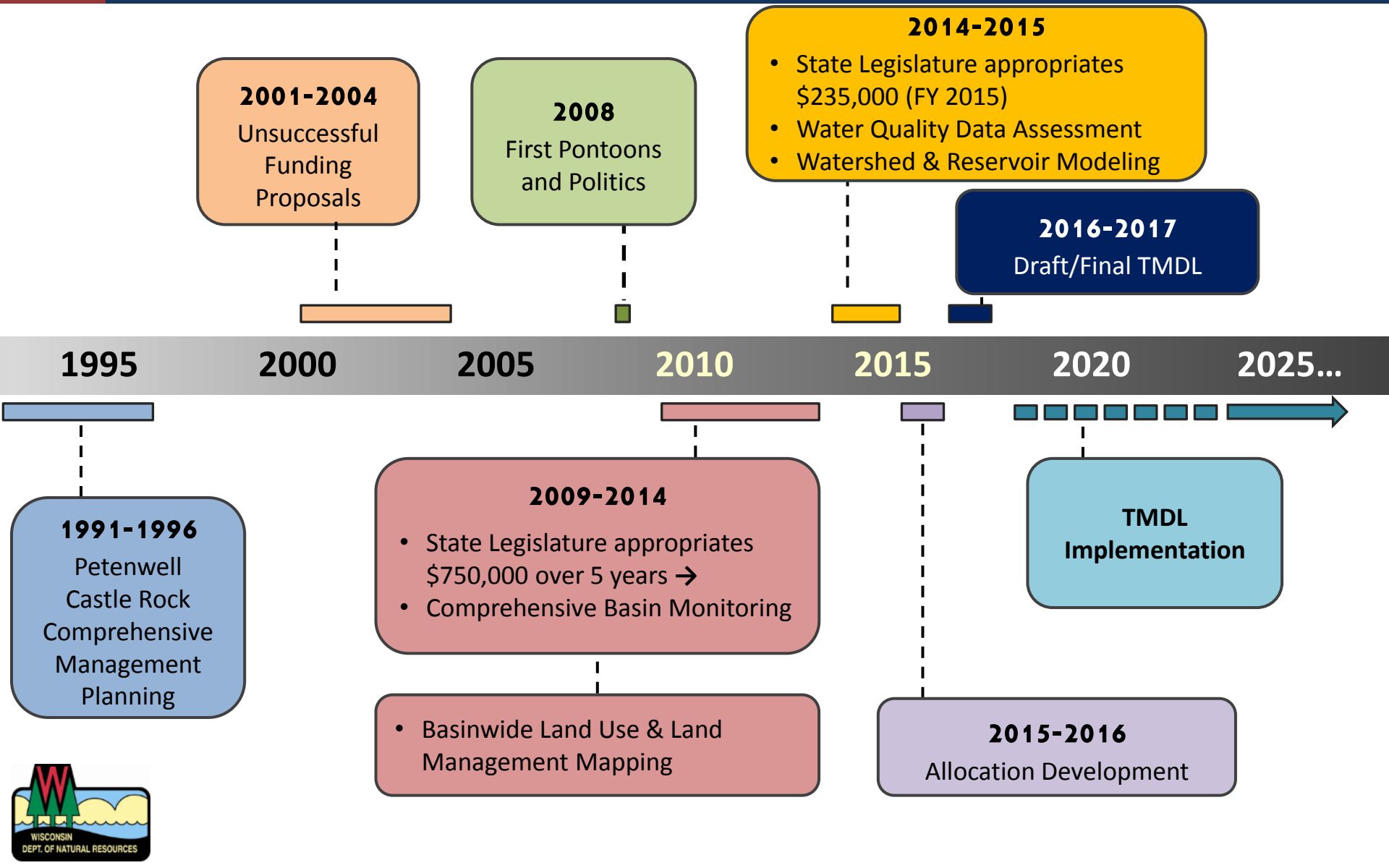

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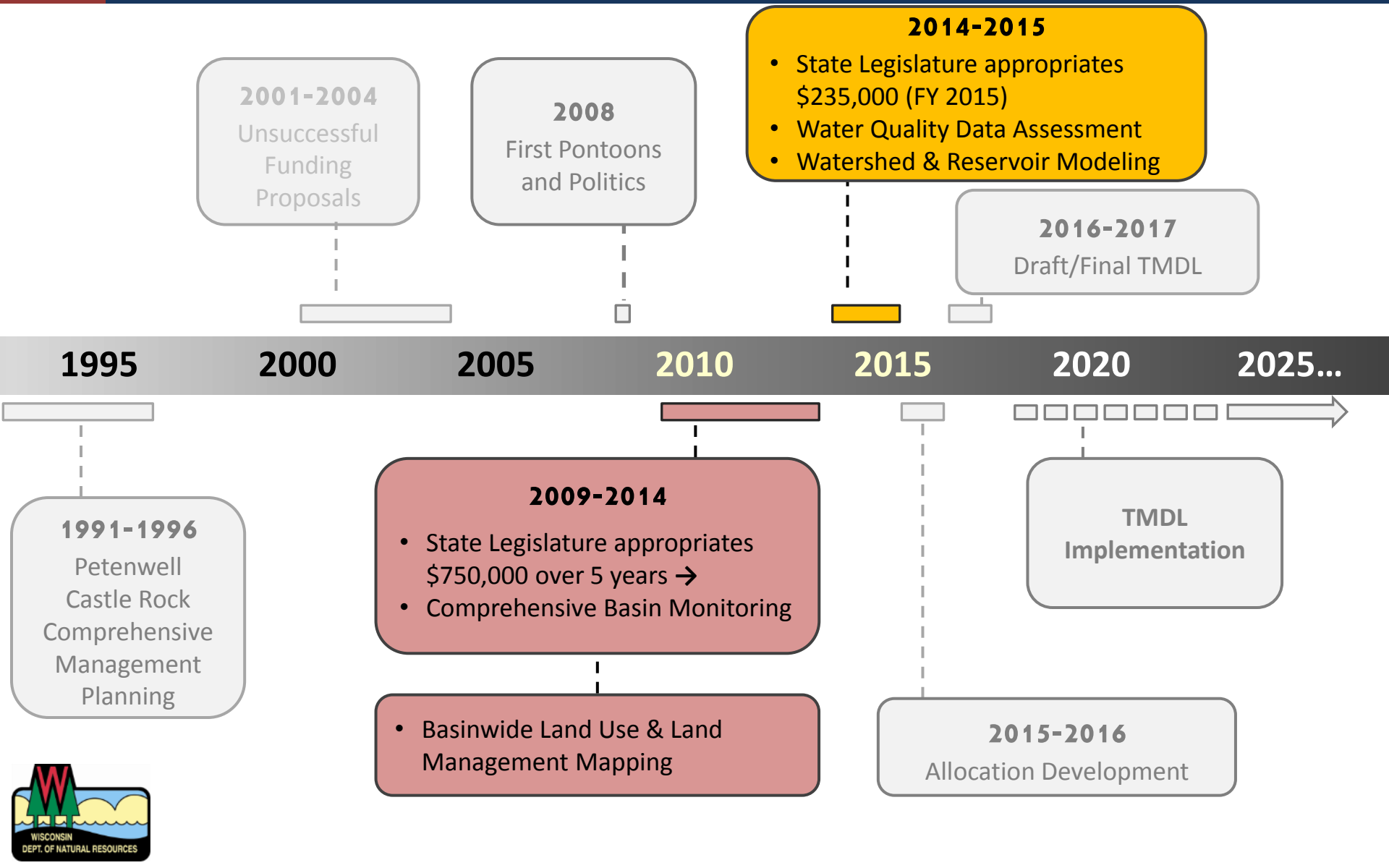
WRB Water Quality Improvement Project

Past, Present and Future…..



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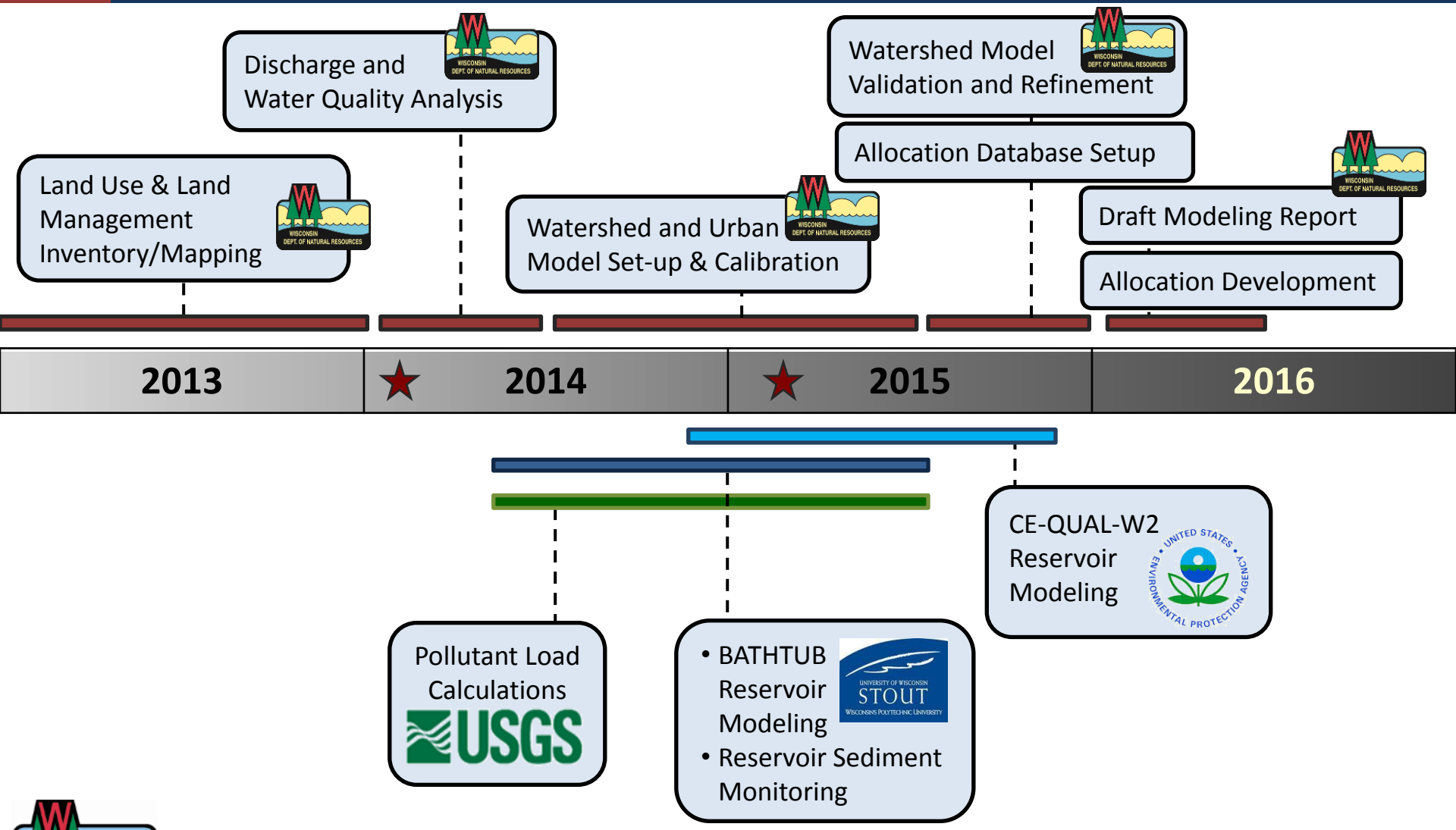
WRB Water Quality Improvement Project

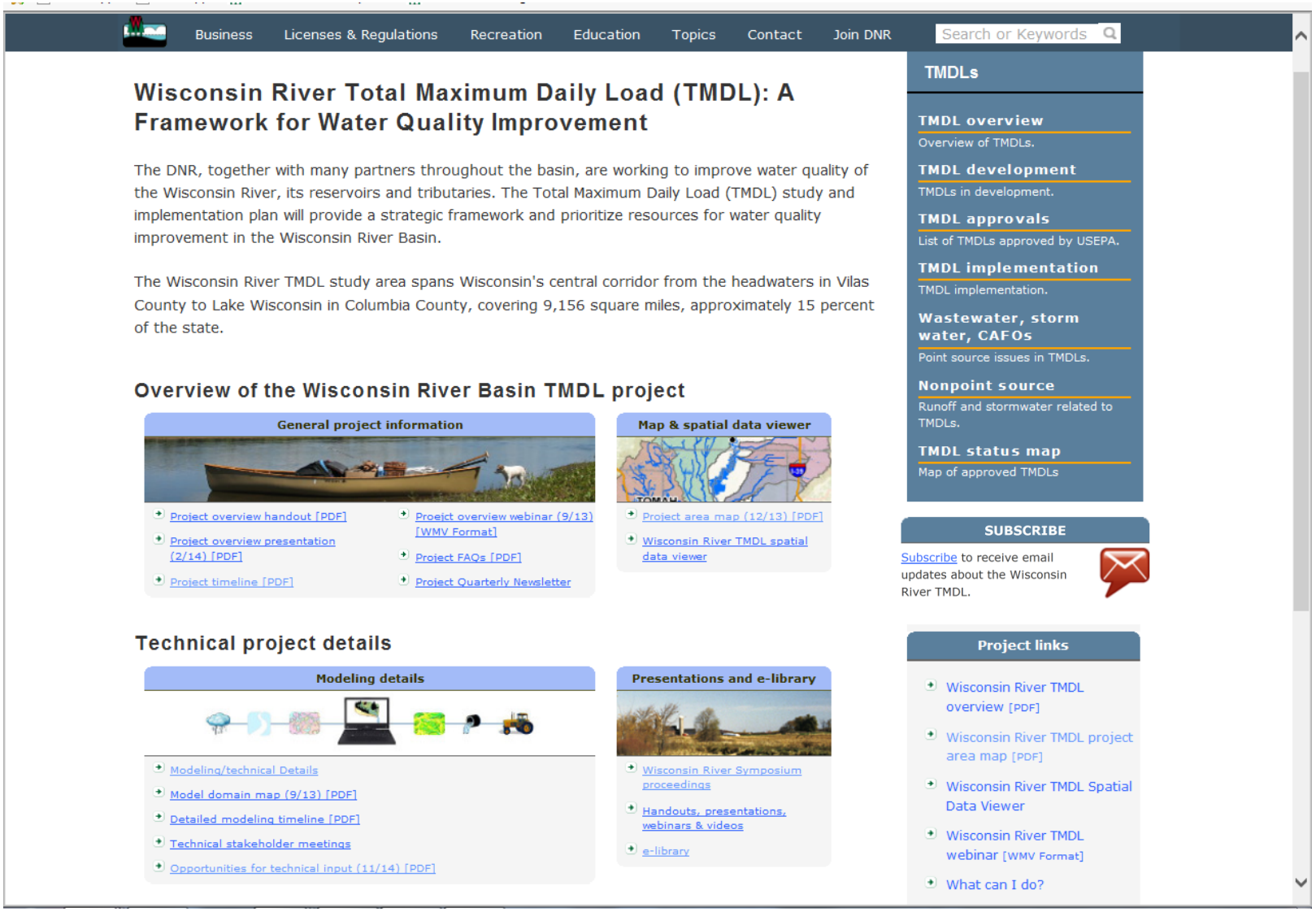
Detailed Technical Timeline



Part II

COMMUNICATION & OPPORTUNITIES FOR INVOLVEMENT

Updated Website



GovDelivery

- Launched August 2014
- Anyone can subscribe/unsubscribe at any time
- Initial invite sent to 281 emails
- Currently 650+ subscribers
- More timely communication than via website
- Approximately one announcement per month
  - → Quarterly Newsletters
  - → Events (e.g. Wisconsin River Symposium)
  - → Notification of new information posted to website
  - → Opportunities for Stakeholder Input/Involvement (draft model review/comments)

Quarterly Newsletters

Updates on the Wisconsin River TMDL and water quality improvement efforts.

Water quality efforts underway

A Total Maximum Daily Load (TMDL) is the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards. A waterway that exceeds water quality standards is often no longer suitable for its designated uses, such as wildlife habitat, fishing, or other recreational activities. The ultimate goal of a TMDL is to improve water quality by reducing pollutants such as phosphorus and sediment.

How did we get a TMDL in the Wisconsin River Basin?

In 2008, the Petenwell and Castle Rock Stewards—a group of local residents and business owners who depend on the Wisconsin River, its reservoirs and tributaries for recreation and for their livelihood—took area legislators out on pontoon boats on Petenwell and Castle Rock Reservoirs. After these elected officials observed the water quality problems firsthand, the state Legislature allocated funding for a water quality improvement project and directed the Wisconsin Department of Natural Resources to develop a TMDL project for the WI River.

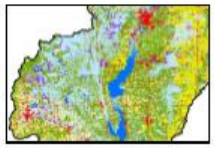
Stay up to date!

A TMDL requires several years of monitoring data to determine where the pollutants are coming from. This data is combined with computer models to determine how reductions can be made fairly and in the most cost-effective way possible. Through this newsletter, the Wisconsin River TMDL team is working to communicate progress on the different stages of TMDL development and invite public feedback. This quarterly newsletter also highlights information, tools and resources available to help with conservation efforts in the state.

Subscribe to receive email updates about the Wisconsin River TMDL.

Created by Susan Sandford - Wisconsin Department of Natural Resources Bureau of Water Quality

IN THIS ISSUE



Mapping the land in the Wisconsin River Basin

The Wisconsin DNR is using an innovative approach to create high quality spatial datasets and maps that will help to prioritize areas for conservation and achieve water quality improvements.

Page 2

EVAAL
Erosion Vulnerability Assessment for Agricultural Lands

EVAAL: A new tool for precision conservation

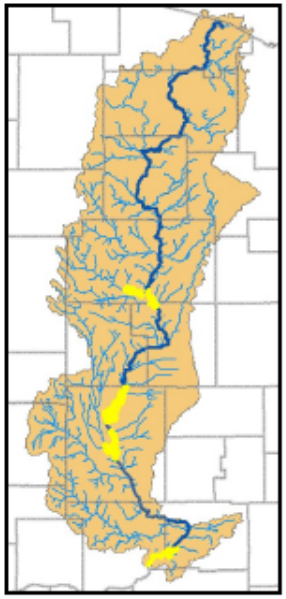
The DNR has developed a new toolset to assist watershed managers in prioritizing areas within a watershed that may be vulnerable to water erosion (and thus increased nutrient export) and thus may contribute to downstream surface water quality problems.

Page 4

Monitoring Water Quality in the Wisconsin River Basin

In December of 2013, DNR wrapped up work on one of the most comprehensive watershed monitoring efforts ever undertaken in the state - four years of flow and water quality monitoring in the rivers, streams and lakes of the Wisconsin River basin. The purpose of this comprehensive, long-term, large-scale monitoring effort was to gain a better understanding of water quality conditions within the basin. This monitoring was the first step in an ongoing, basin-wide effort to reduce the amount of phosphorus in Wisconsin River basin waterways, thereby reducing the frequency and severity of toxic blue green algae blooms and improving aquatic habitat and recreational opportunities.

The framework for this basin-wide water quality improvement effort is the development of a *Total Maximum Daily Load* (TMDL). A TMDL is the maximum amount of a pollutant that a body of water can receive and still achieve water quality standards. Through monitoring and computer modeling, we can use the TMDL process to determine how much phosphorus needs to be reduced in order to achieve water quality standards, and how to achieve the needed phosphorus reductions.



The Wisconsin River TMDL study area

The Wisconsin River TMDL study area spans Wisconsin's central corridor from the headwaters in Vilas County to Lake Wisconsin in Columbia County, covering 9,156 square miles - approximately 15 percent of the state. The hydrologic network within the basin (or watershed) includes the *main stem* of the river, smaller rivers and streams called *tributaries* that flow into the main stem of the river and impounded waters, called *reservoirs*.

Tributary	The rivers and streams that flow into the Wisconsin River are called tributaries.
River Main Stem	The main stem of the Wisconsin River is the large river channel that originates in the forests of Vilas County in northern Wisconsin, flows south across the glacial plain of central Wisconsin, then west starting near Portage, until it joins the Mississippi just south of Prairie du Chien.
Reservoir	A reservoir is a man-made impounded lake, created by damming a flowing river or stream. There are many reservoirs in the Wisconsin River basin. Five major reservoirs were monitored as part of the Wisconsin River TMDL project, including Big Eau Pleine, Lake DuBay, Petenwell, Castle Rock and Lake Wisconsin.
Watershed	A watershed is the area of land that drains to a specific stream, river or lake. Watersheds exist at different scales. For example, each Wisconsin River tributary stream has its own smaller watershed. These tributary watersheds, together with the lands that drain directly to the Wisconsin River, collectively comprise the Wisconsin River watershed.

Quarterly Newsletters

Mapping What's Happening on the Land in the Wisconsin River Basin

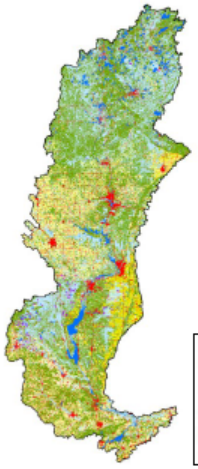
All of the activities that occur on the land have an impact on what happens in our waterways. When it rains, water runs over the land, picking up sediment and nutrients and transporting them to streams, rivers, and lakes. One of these nutrients is phosphorus. Phosphorus is essential to plant growth, which is why people apply it to their lawns, gardens and agricultural fields. However, if too much phosphorus washes off the land and into water bodies, it can cause severe weed and algae growth that can harm fish and aquatic life, decrease recreational opportunities, and create health risks for people and pets.

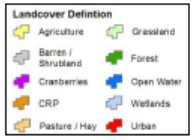
There is a major effort underway to improve water quality in the Wisconsin River Basin. The framework for this effort is a Total Maximum Daily Load (TMDL), which is the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards. A waterway that exceeds water quality standards is referred to as "impaired" and is no longer suitable for its designated uses, such as wildlife habitat, fishing, or other recreational activities.

Understanding what is occurring on the landscape is a critical part of understanding what is happening in the water and figuring out how to achieve better water quality. The Wisconsin River Basin covers 9,156 square miles, approximately 15 percent of the state, and figuring out what is happening on all of that land is no small task. The DNR is using an innovative and efficient approach to generate high quality, high resolution maps of the landscape in the basin. These maps and the underlying data will increase our ability to protect and restore healthier waterways.

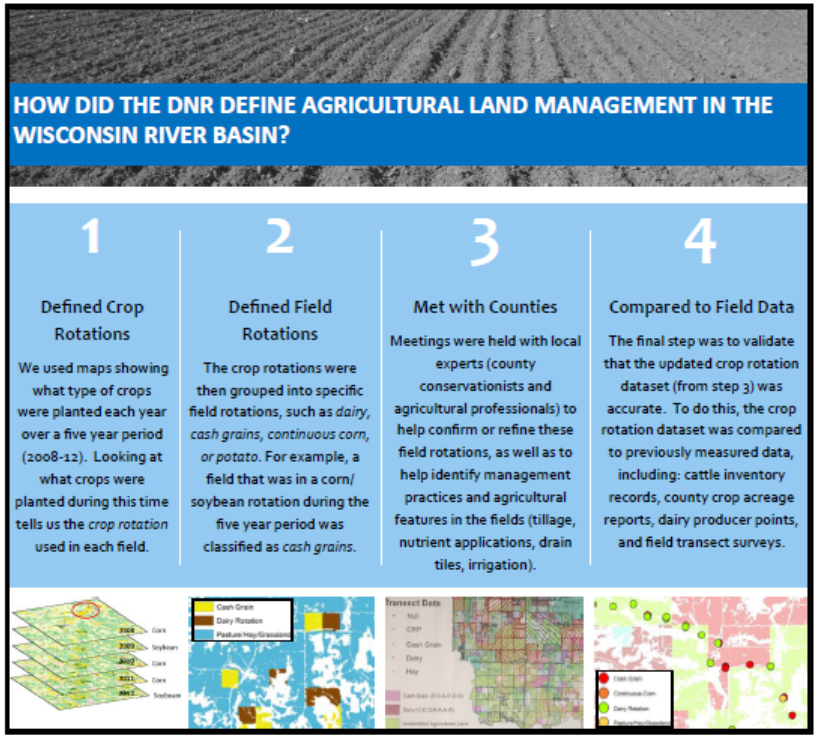
How do we calculate pollutant loads from agricultural and natural areas?

In order to determine where the nutrients are coming from, the DNR uses a combination of field research and computer model simulations. One of these computer models is called the Soil and Water Assessment Tool (SWAT), which uses information about the landscape (e.g. soil type, elevation, land cover, land management, etc.) to predict where the nutrients are coming from within the watershed.





The SWAT model uses satellite images to determine the land cover types within the basin, such as agriculture, grassland, wetland, forest, urban, etc. This is an important part of the model because the land cover can affect the amount of rain and nutrients coming off of the land and entering a nearby stream or river. It is important to further break down the agricultural land cover, especially in the Wisconsin River Basin where nearly 25 percent of the land is agricultural, ranging from the dairy farming in the north central region to potatoes and vegetables in the central sands, and corn and soybean crops in the southern region. Individual farms also use different management styles (e.g. what crops are planted, how much tillage is occurring, and how nutrients are applied), creating an even greater variety of activities on the land. Due to this unique challenge, the DNR chose to use a new approach to better define the land management within the basin. The steps used are detailed in the graphic below.



This is the first time a TMDL in Wisconsin has used such a detailed and in-depth process, incorporating knowledge from local experts. Using this new and innovative approach, DNR was able to create high quality spatial datasets and maps that will help prioritize areas for conservation and achieve water quality improvements. The data has also been shared with counties to help them in their work with farmers and to get conservation practices installed where they are most needed. Kurt Calkins, Director of Land and Water Conservation for Columbia County, shared his thoughts on this: "Having the best available data in the model is a win-win for everyone, because it will help us better define areas on the agricultural landscape that have the greatest potential for reductions. Having quality data in a quality model helps bring all the players to the table with the higher degree of buy-in regarding sources and reductions."

> "Having the best available data in the model is a win-win for everyone, because it will help us better define areas on the agricultural landscape that have the greatest potential for reductions."

Draft Models - Accessible for Review

Model	Model Development	Estimated Date	Model Calibration	Estimated Date
SWAT	☑ Model Setup	Jan 2015	Model Calibration	Summer 2015
SLAMM	☑ Urban Model Area & Reach Mapping	Jan 2015	SLAMM Model	Summer 2015
BATHTUB	Model Setup	April 2015	Model Calibration	Summer 2015
CE-QUAL-W2	Hydrodynamic Calibrated Model	April 2015	Water Quality Calibrated Model	Summer 2015

Draft Models – Response to Comments

Response to comments on Estimations of Loads and Sources of Phosphorus and Sediment at Ungauged Sites in the Wisconsin River Basin: *Preliminary Notes on SWAT Model Configuration*

Note: The above title will hereafter be referred to as "the model document."

The statements in this document were made in response to comments and questions on DRAFT models. DRAFT models are a work in progress, a snapshot in time. As such, the approach described herein and the models referenced are continuously evolving and subject to change. Many of the issues raised in comments were in the process of already being addressed.

Nonpoint Stakeholders

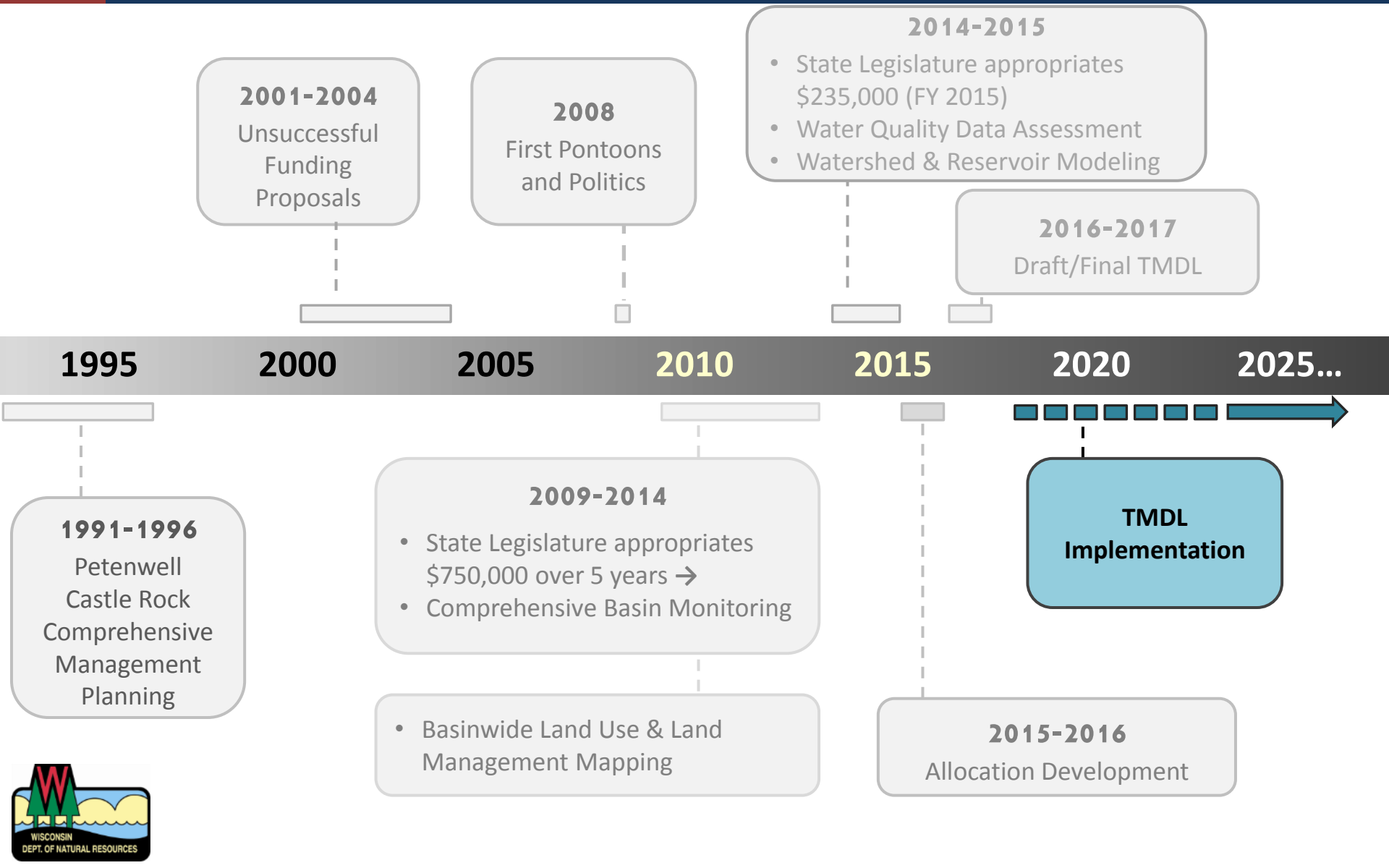
Wisconsin River Basin Water Quality Improvement Project

Part III

TMDL IMPLEMENTATION

WRB Water Quality Improvement Project

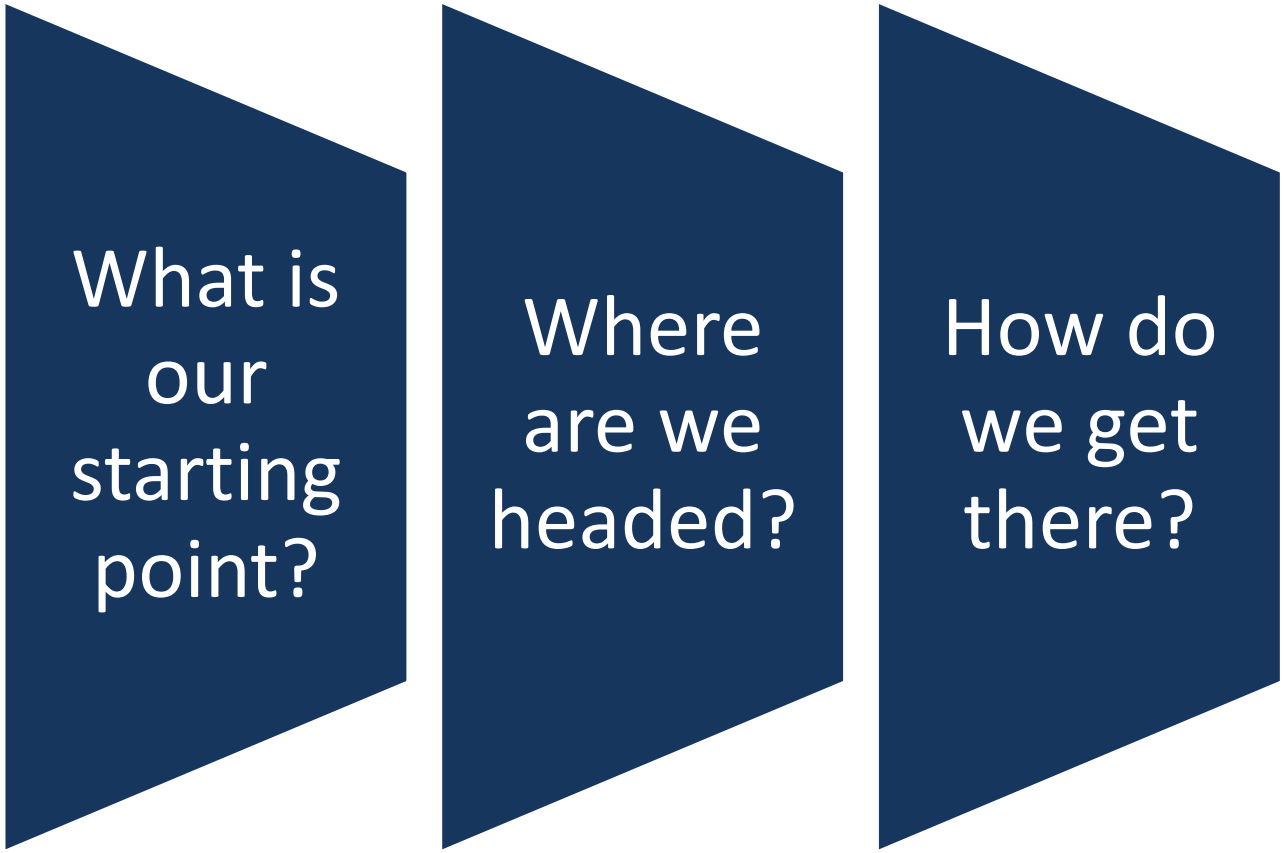
Past, Present and Future…..



WISCONSIN DEPT. OF NATURAL RESOURCES

WRB Water Quality Improvement Project

TMDL Implementation



WRB Water Quality Improvement Project

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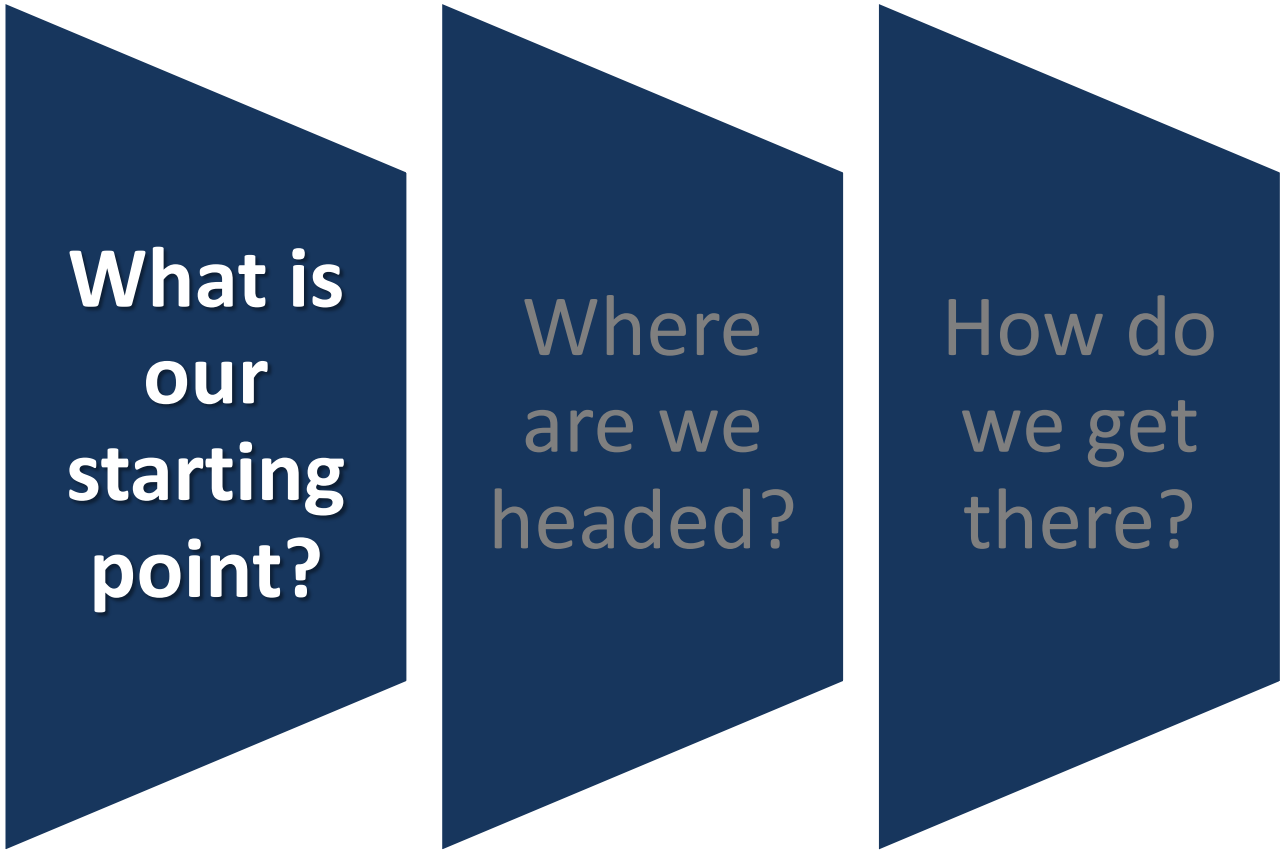
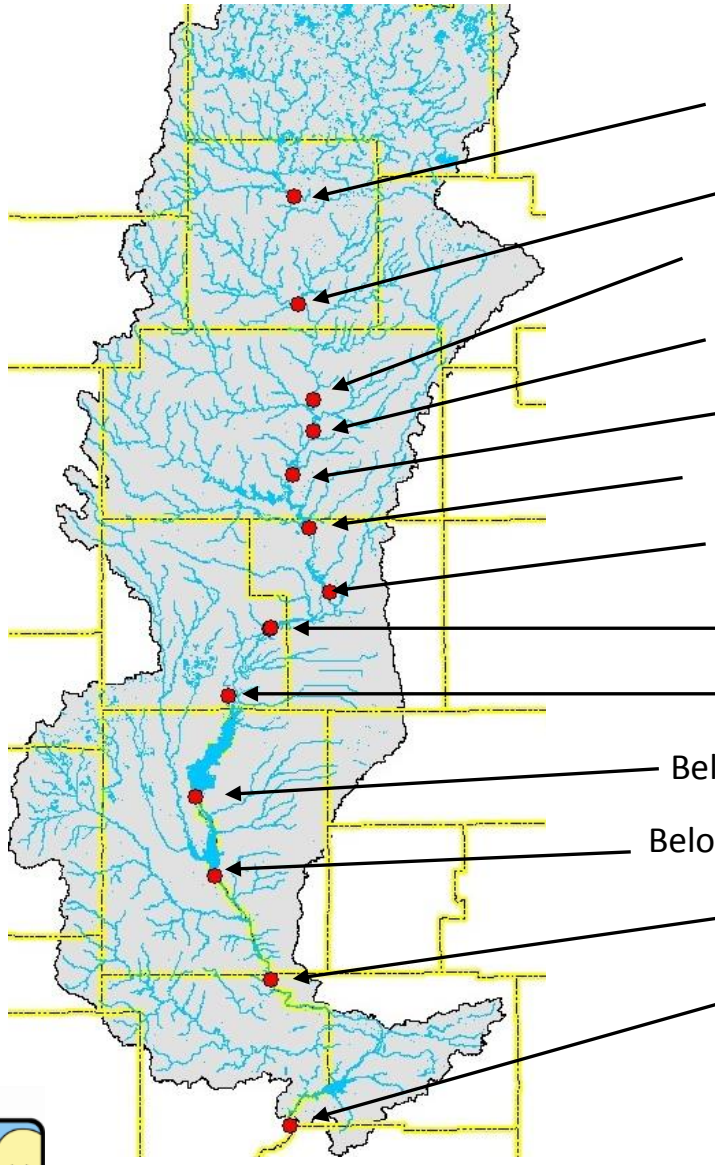
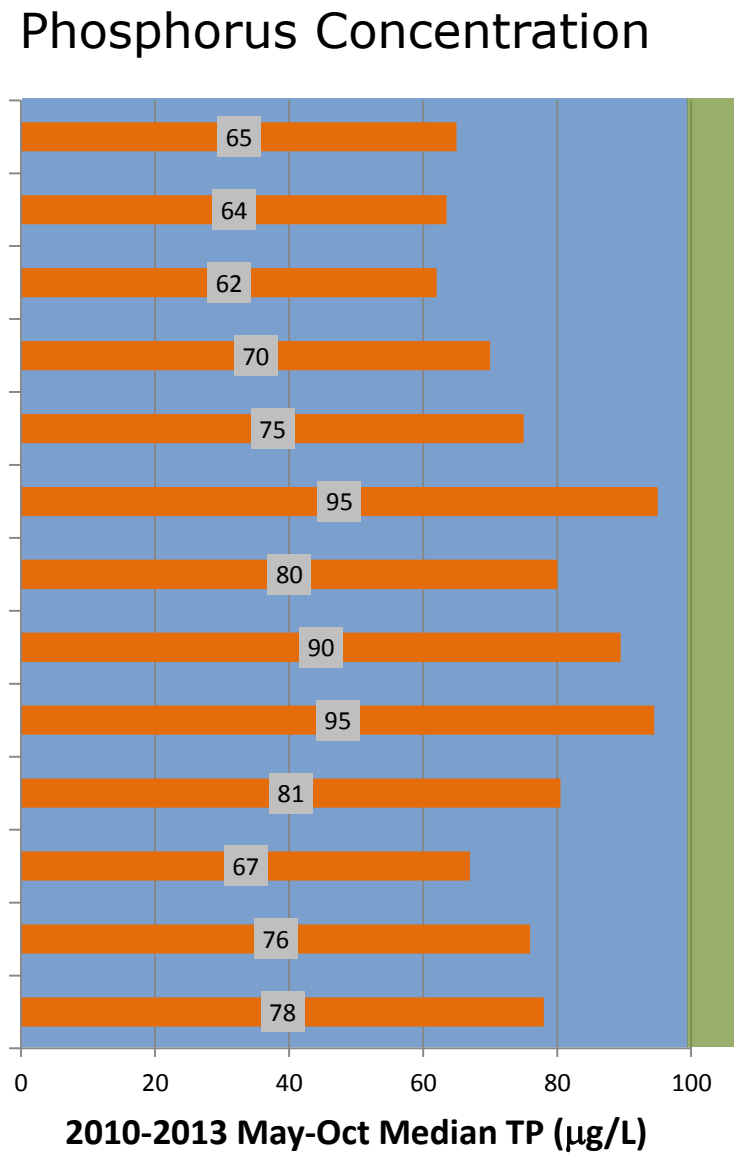


WISCONSIN DEPT. OF NATURAL RESOURCES

Main Stem Monitoring Results





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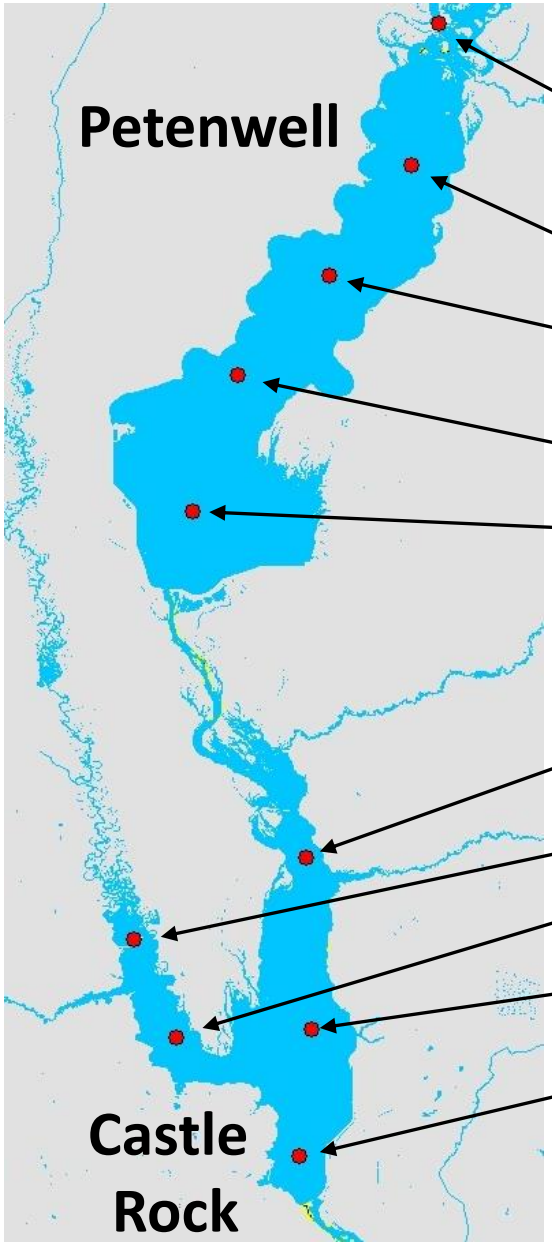
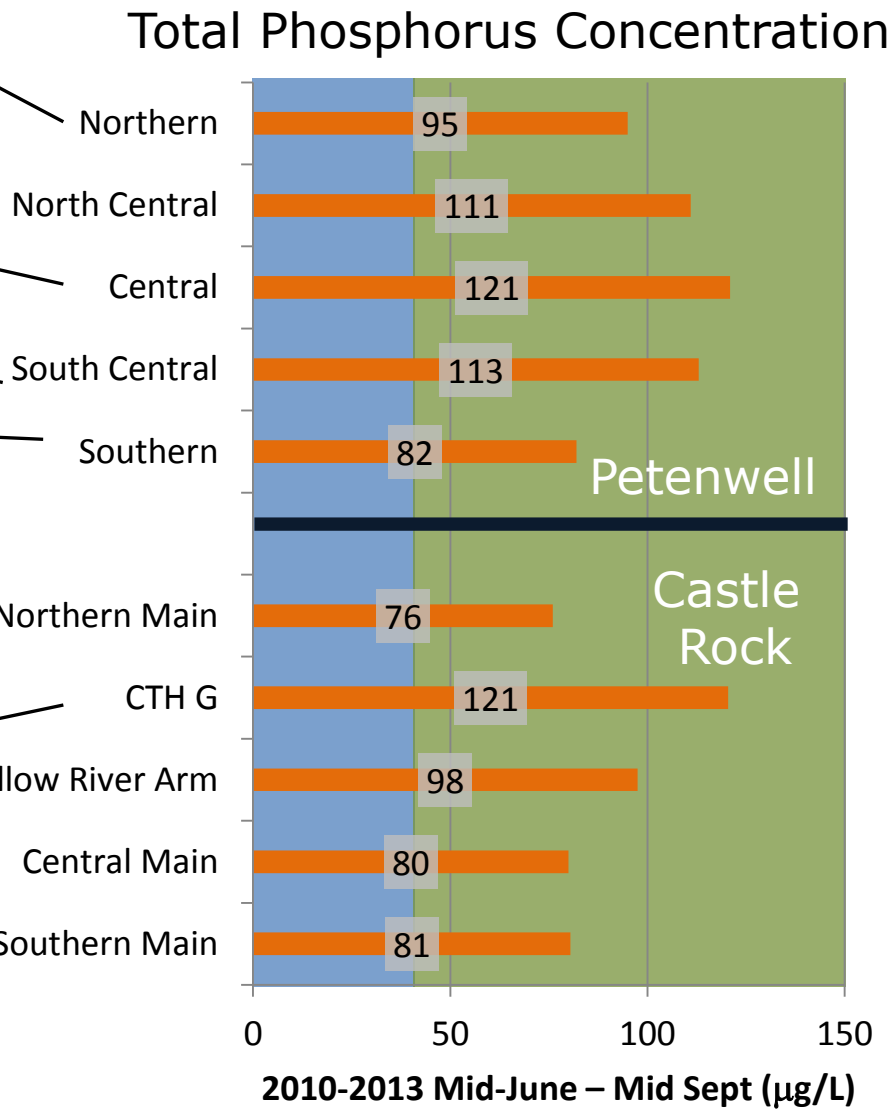
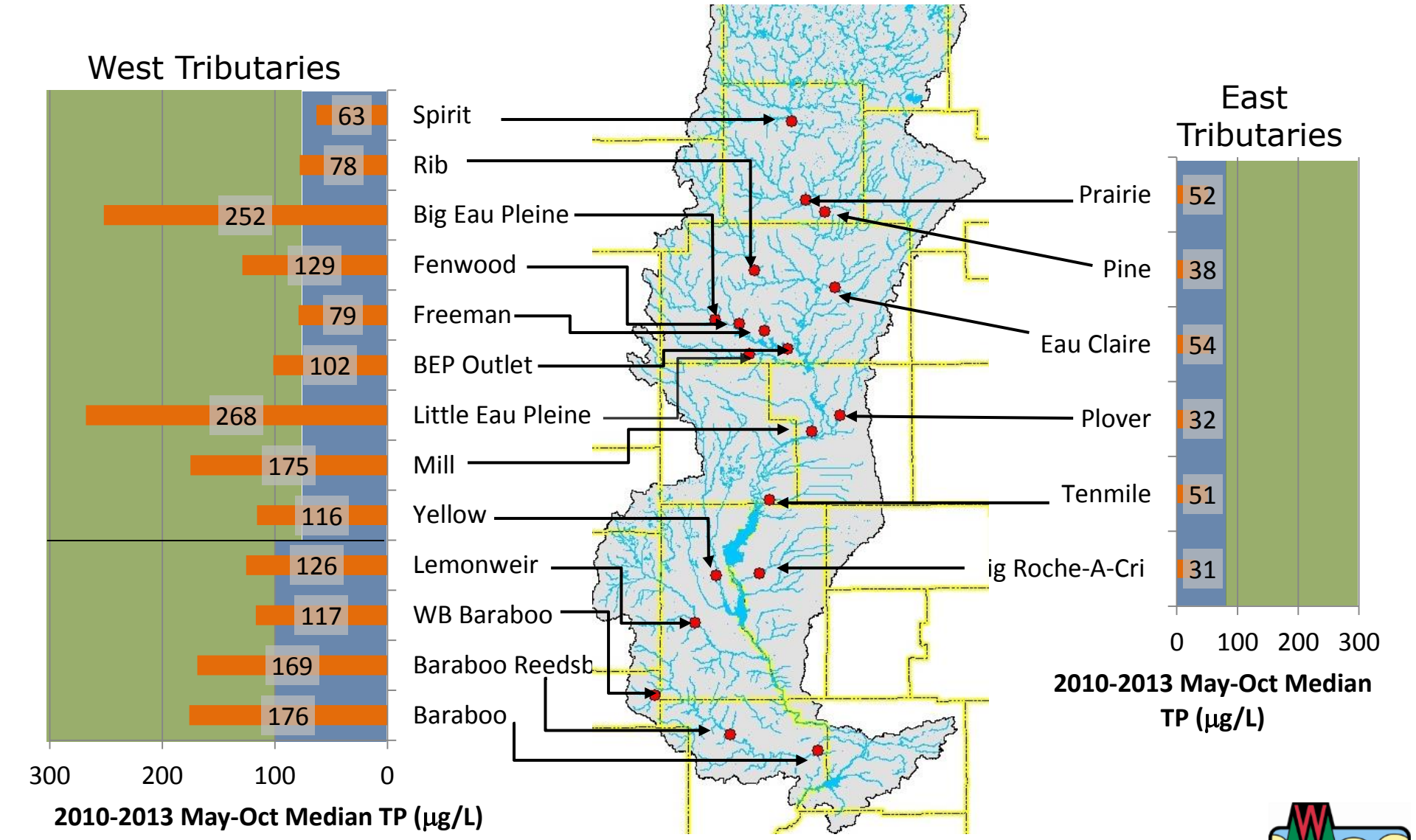
Major Reservoir Monitoring Results

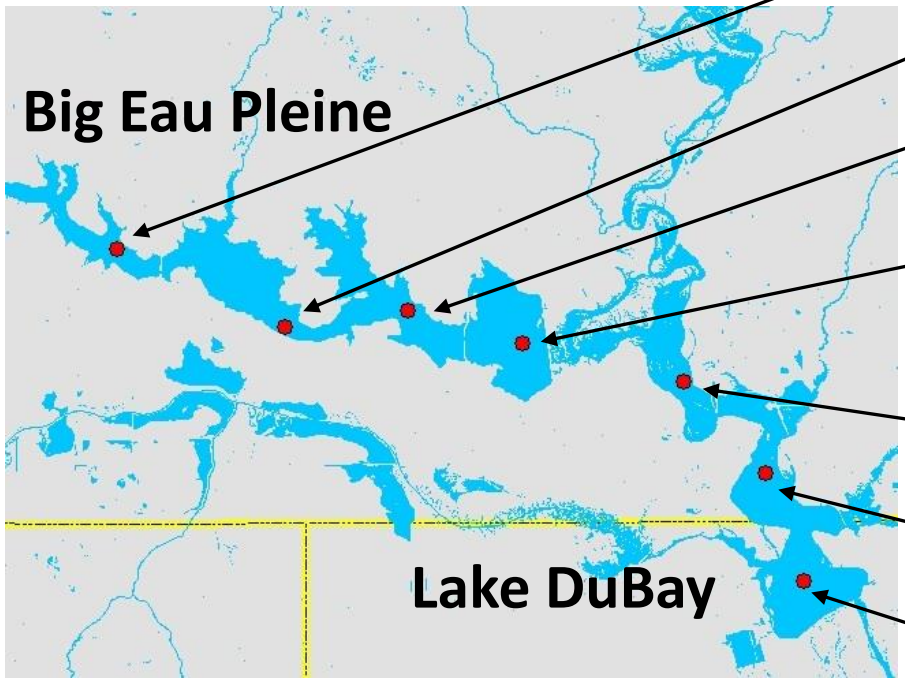


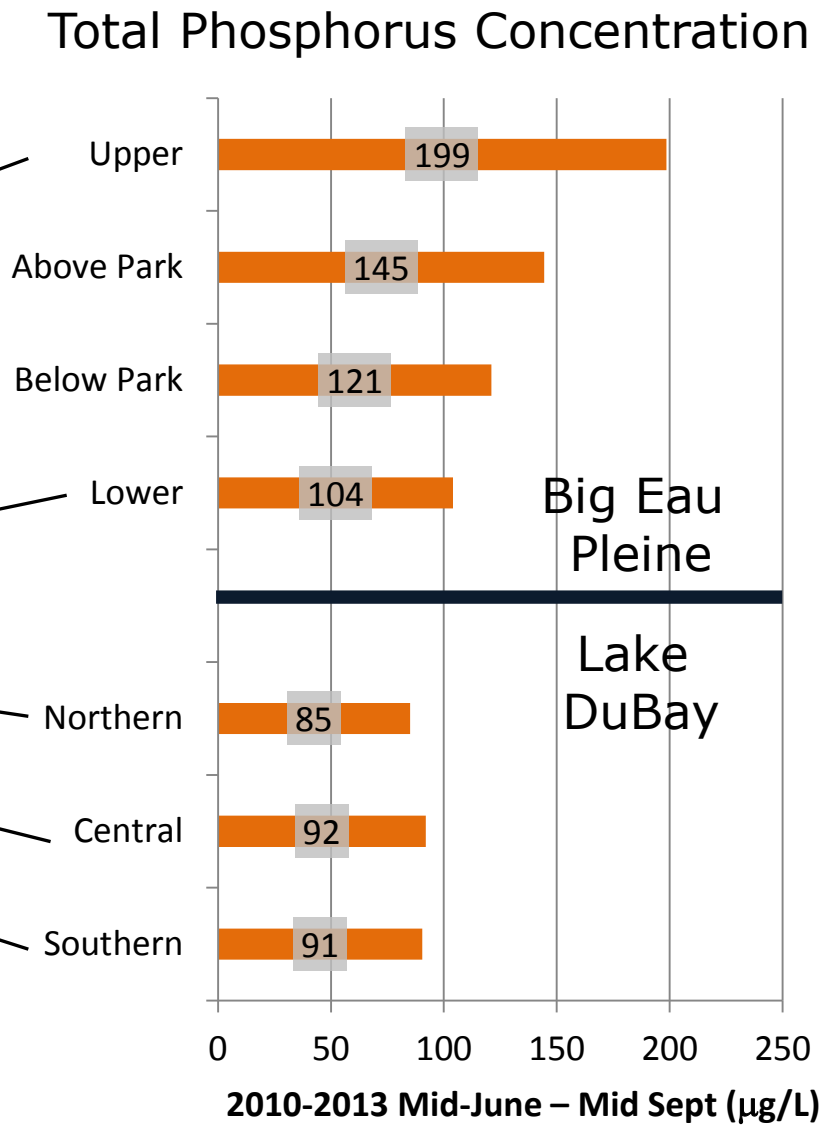


Tributary Monitoring Results – Total P Concentration



Major Reservoir Monitoring Results





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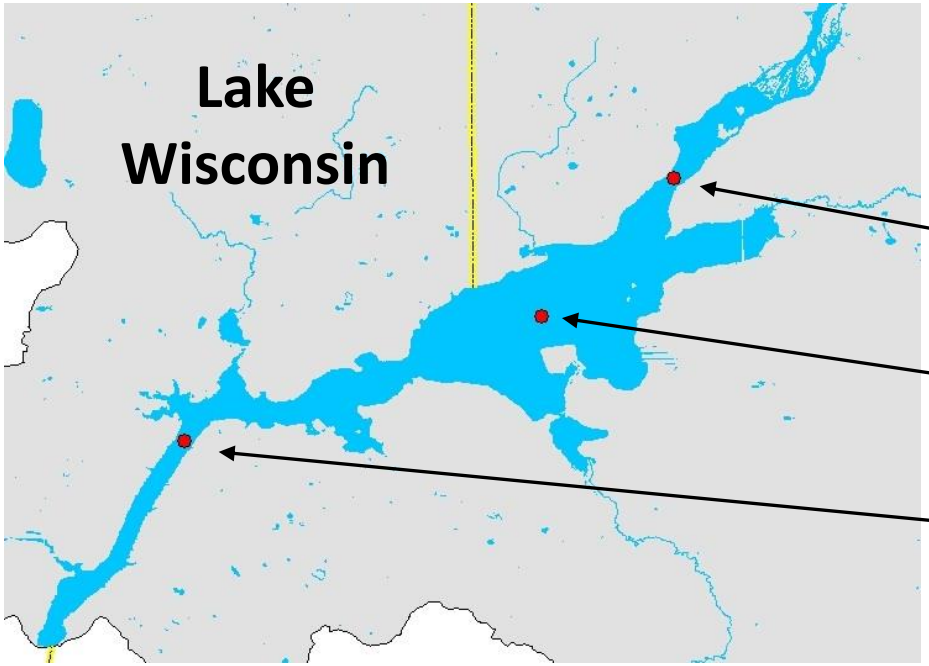
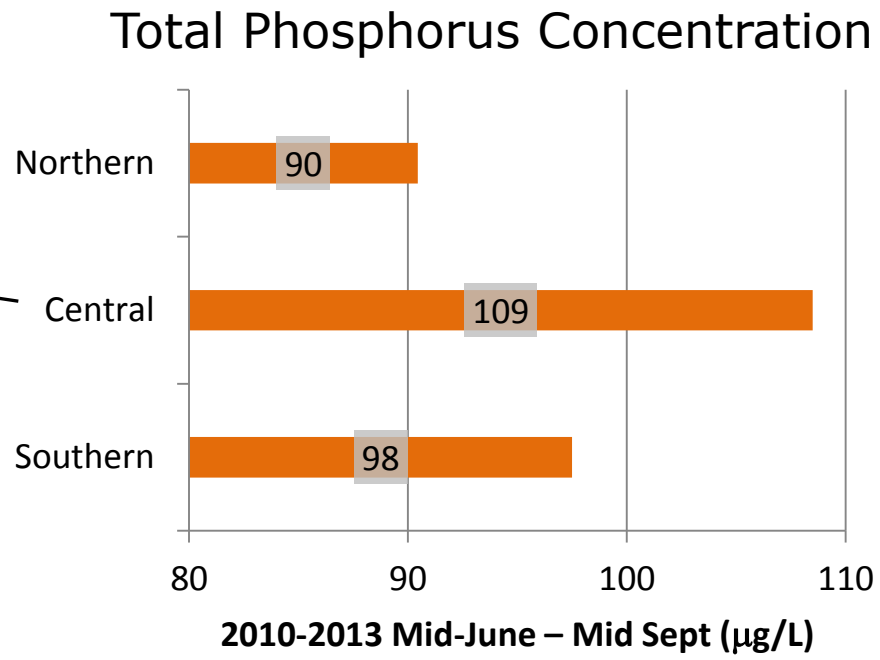
Major Reservoir Monitoring Results

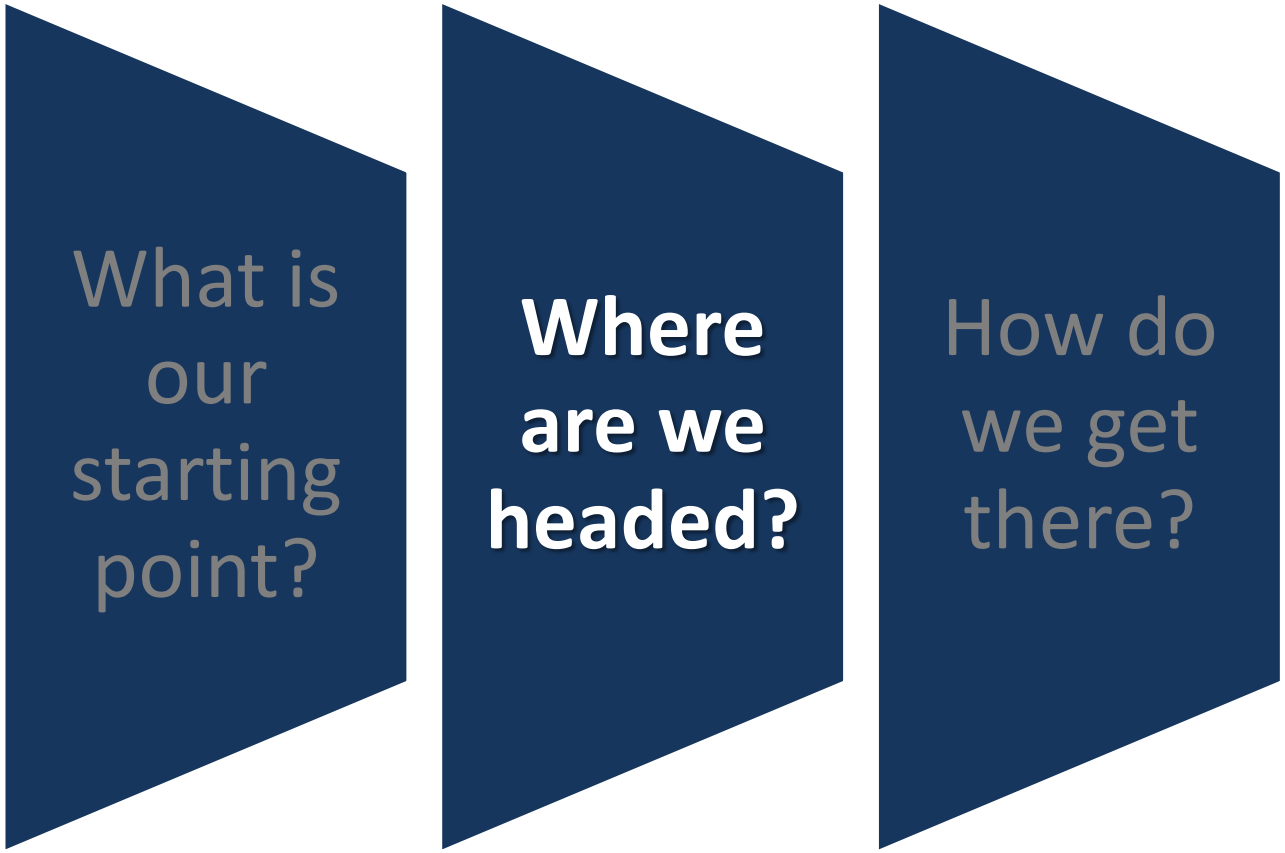




WISCONSIN
DEPT. OF NATURAL RESOURCES

WRB Water Quality Improvement Project

TMDL Implementation



WISCONSIN DEPT. OF NATURAL RESOURCES

Statewide Phosphorus Criteria

Rivers

100 µg/L

Streams [1]

75 µg/L

Reservoirs

- Not Stratified = 40 µg/L
- Stratified = 30 µg/L

Inland Lakes[2]

Ranges from 15-30 µg/L

Great Lakes

- Lake Michigan = 7 µg/L
- Lake Superior = 5 µg/L

[1]All unidirectional flowing waters not in NR 102.06(3)(a). Excludes Ephemeral Streams.

[2]Excludes wetlands and lakes less than 5 acres

Phosphorus

Toxic algae blooms

Public health risks

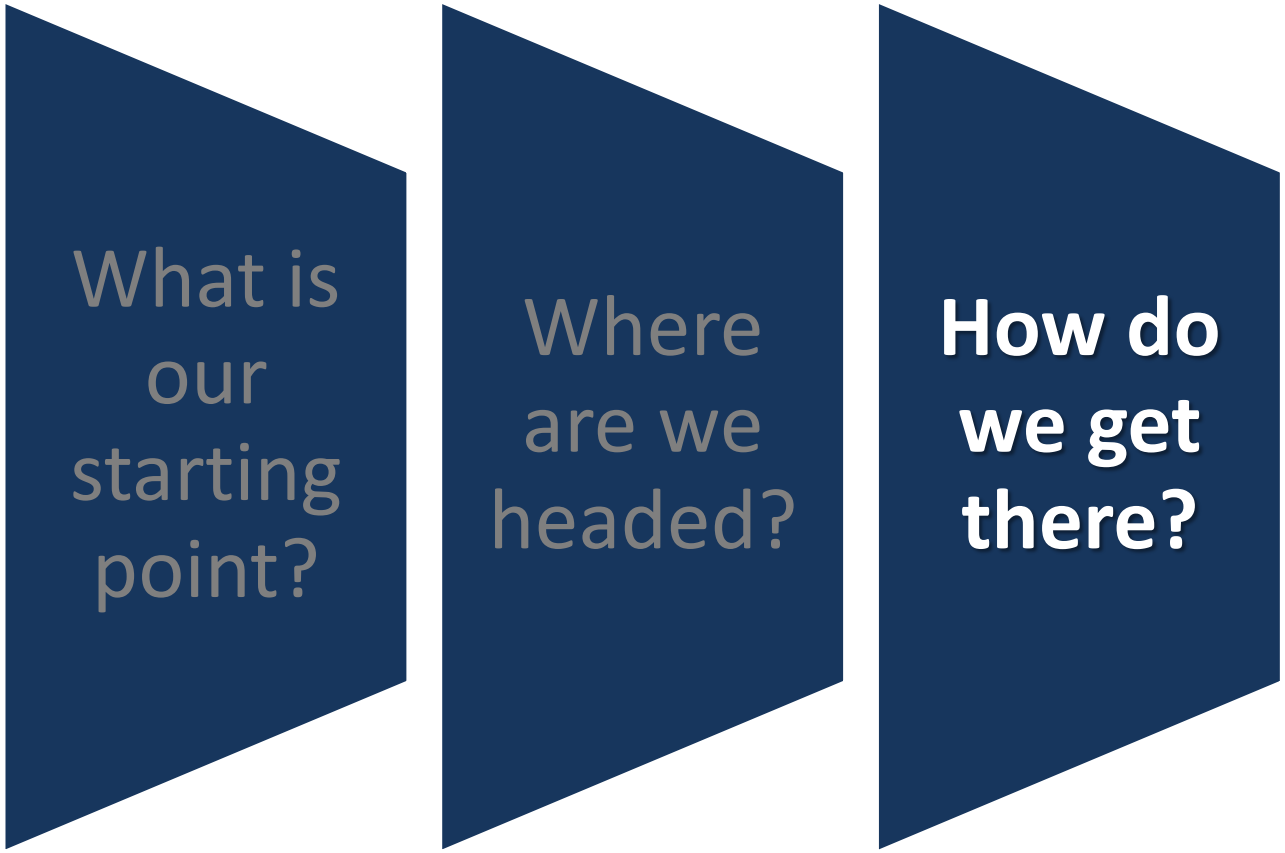
Clean Water

Fish & Wildlife

Recreation

WRB Water Quality Improvement Project

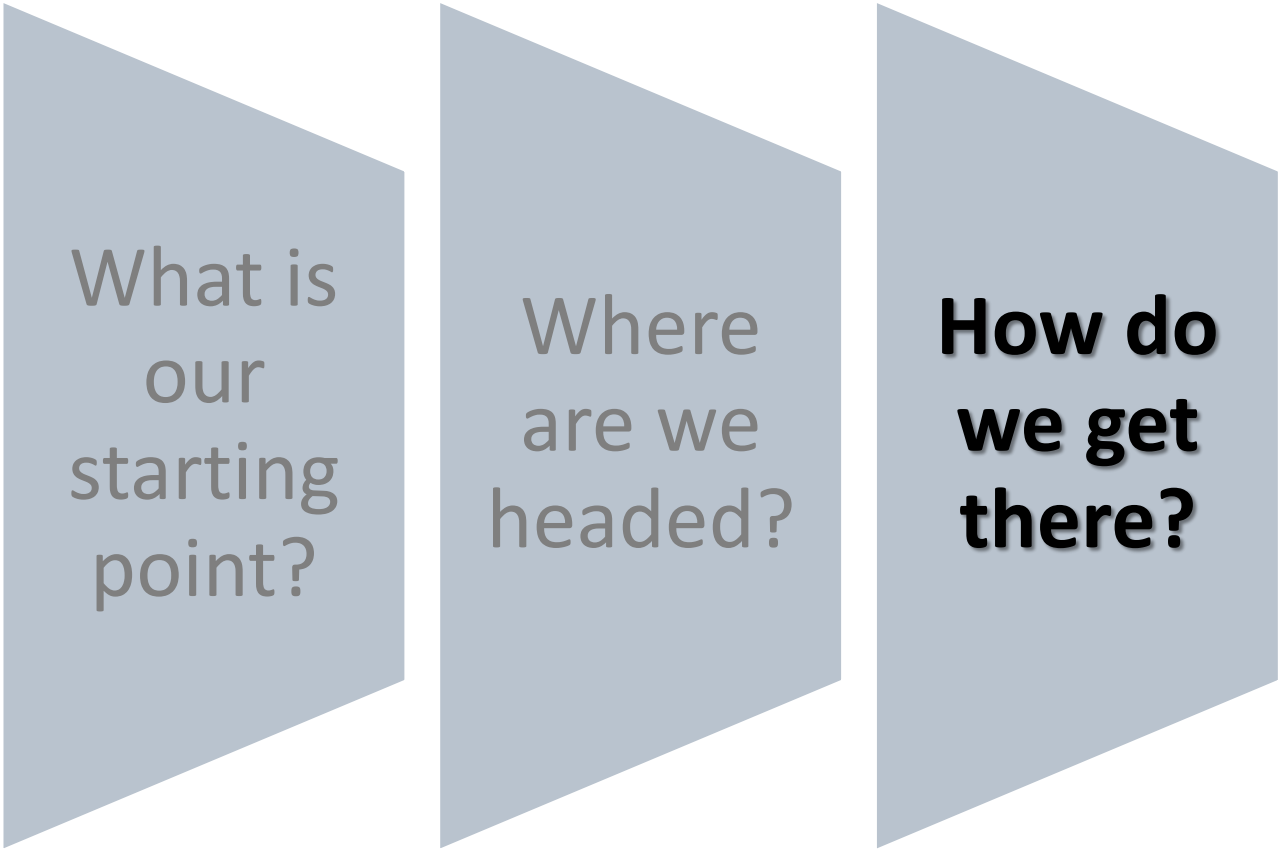
TMDL Implementation



WISCONSIN DEPT. OF NATURAL RESOURCES

WRB Water Quality Improvement Project

TMDL Implementation



….and whose responsibility is it?

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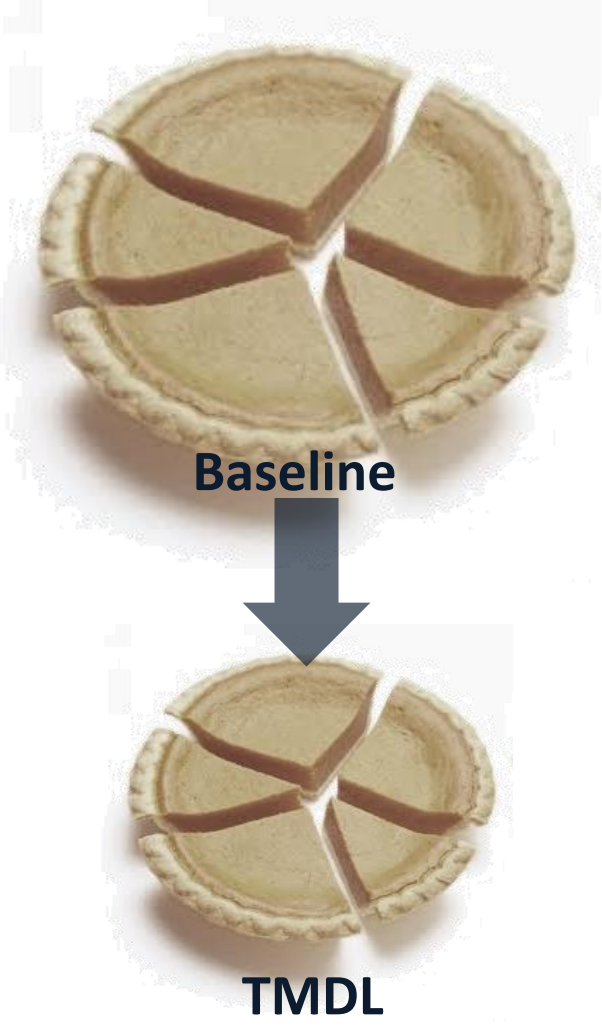
Proportional Reduction Allocation Method = Everyone Does their Fair Share



- Proportional allocation method is developed from **baseline conditions**
- **Baseline Conditions** reflect current regulatory requirements, **NOT** current performance
- The TMDL load for each reach is divided proportionally according to each source's baseline load contribution

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TMDL Implementation – Wasteload Allocations

How? ….

TMDL waste load allocations are incorporated into permits

- Municipal and Industrial Wastewater
- Permitted Municipal Storm Sewer Systems
- CAFO Production Areas (zero allowable discharge)

Who?

- **DNR** – sets limits based on allocations
- **Permitted facilities** – implement limits

TMDL Implementation – Nonpoint Source

How? Establish partnerships to implement best management practices on the landscape

- **Fair Share**- Everyone does what they reasonably can
- **Targeting** – Use available resources to put extra effort towards high loading watersheds/areas

Who?

- County Staff
- Agricultural producers
- Agricultural organizations
- Conservation Organizations
- Crop Consultants
- Citizens/Groups
- DNR/DATCP
- NRCS

What does NPS implementation look like?

Every county, and every "reach –shed" faces unique challenges and opportunities. A few examples….

Physical Conditions
- Sandy /Clayey Soils
- Shallow groundwater
- Steep slopes
- Drainage tiles/ditches
- High wind erosion

Land Use/Management
- Dairy/Beef
- Cash Grain
- Potato/Vegetables
- Cranberries

Social - Political
- LCC/County Board
- Financial Resources
- Institutional capacity
- Social Norms / Values

One size fits all?

What does NPS implementation look like?

Examples of NPS Implementation Tools/Resources

- 9-Key Element Planning
- County Land and Water Plan Updates
- State Grant Funded Projects (Planning/Implementation)
  - TRM/NOD
  - UNPS
  - Lake Protection
  - River Protection
- Farmer Led Initiatives
- Federal Funding Programs (NRCS)

One size fits all?

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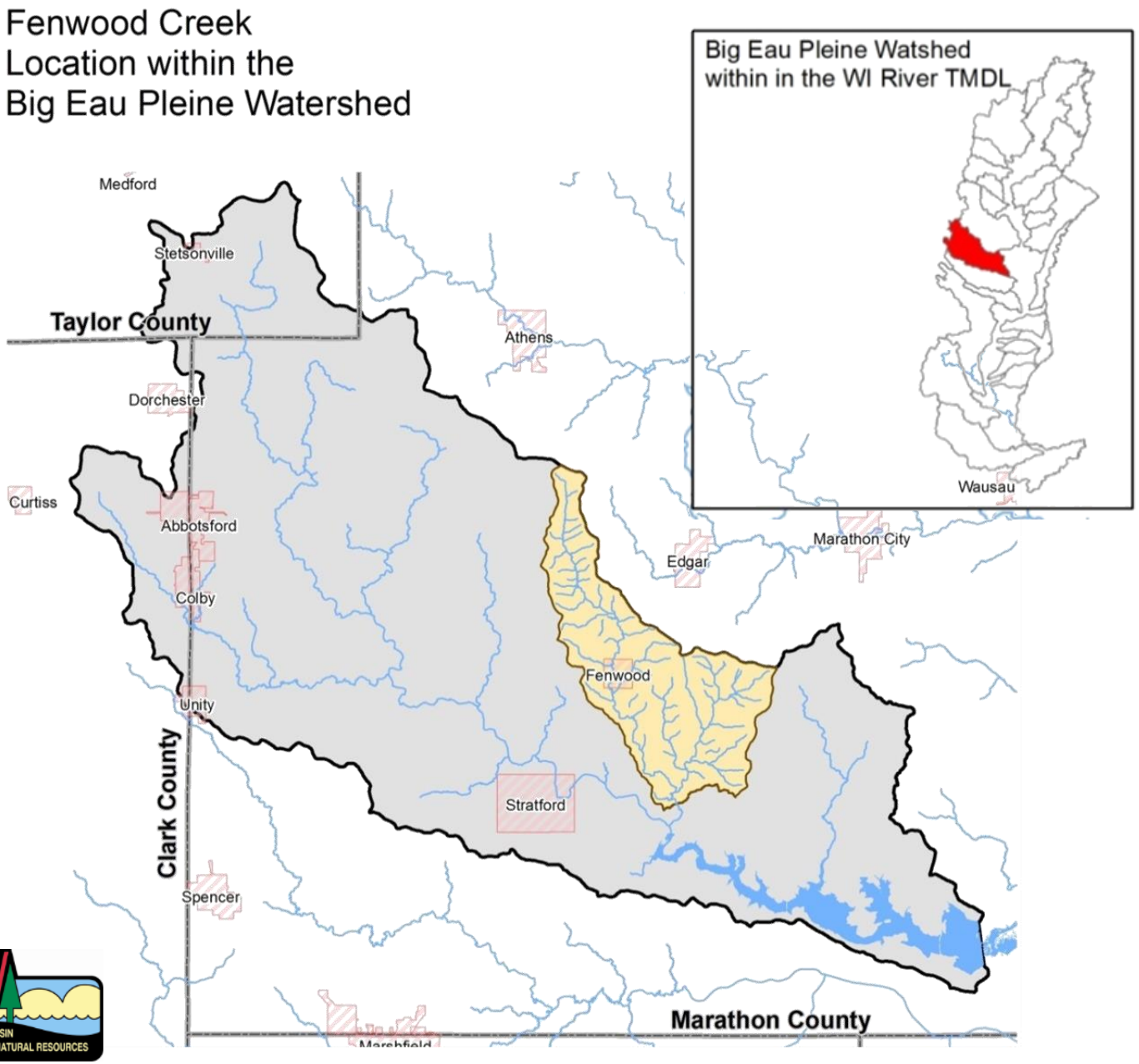
Fenwood Creek Watershed 9-Key Element Plan

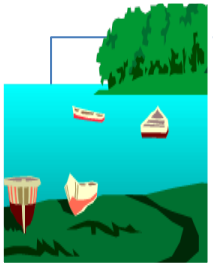


What Can Citizens Do?

Get involved locally!

Get Involved in Land and Water Resource Planning

- Get a copy of your county plan and see what it says about issues important to you!
- Become a planning committee member



Get involved in local lake planning and management

Encourage your county to apply for grants

- TRM
- Lake Protection
- River Protection

Join your local Lake or Watershed group

Get involved in volunteer citizen monitoring

Ask yourself, what is my fair share? What can I do personally?

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Wisconsin River Basin Water Quality Improvement Project

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Wisconsin River Basin Water Quality Improvement Project